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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/076,748	02/13/2002	Tetsuya Uda	HITACHI-0030	1800

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EXAMINER	
WANG, QUAN ZHEN	
ART UNIT	**PAPER NUMBER**
2633	

DATE MAILED: 12/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/076,748	UDA ET AL.	
	Examiner	Art Unit	
	Quan-Zhen Wang	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 November 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30 and 32-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30 and 32-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

In view of the newly discovered reference(s) to Kosaka (U.S. Patent US 6,091,539), the Final Office Action mailed on July 26, 2005 has been withdrawn. A new Non-Final Office Action is as follows.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1-5, 12-18, 24-28, and 33-34 are rejected under 35 U.S.C. 102(a) as being anticipated by Kosaka (U.S. Patent US 6,091,539).

Regarding claims 1 and 14, Kosaka teaches a system of controlling optical signal during transmission (fig. 5), comprising: a first (fig. 5, the optical fiber connected to left hand side of element 11) and second optical fibers (fig. 5, the optical fiber connected to right hand side of splitter 13) for transmitting a wave division multiplexed optical signals having a predetermined set of ranges of wavelength (fig. 5, $\lambda 1$-$\lambda 4$); an amplifier (fig. 5, amplifier 12) connected to the first optical fiber for amplifying the wave division multiplexed optical signal according to a predetermined amplification characteristic (the amplification characteristic in inherently predetermined) to generate an amplified wave division multiplexed optical signal; a first monitor (fig. 5, detector 14b) connected to the

second optical fiber for monitoring a total optical strength level of at least one of the ranges of the amplified wave division multiplexed optical signal; a second monitor (fig. 5, detector 14d) connected to the second optical fiber for monitoring a probe optical strength level of at least one of the wavelengths of the amplified wave division multiplexed optical signal (column 9, lines 27-35); and an adjustment unit (fig. 5, first controller 16) connected to the amplifier, the first and second monitor for adjusting the amplification characteristic so that the average value of the total optical strength level (column 9, lines 51-58) and the probe optical strength level substantially matched in order to substantially reduce a gain tilt and an optical signal-to-noise ratio in the amplified wave division multiplexed optical signal (fig. 2(a)-(c); column 9, lines 59-67 and column 10, lines 1-25).

Regarding claim 2, Kosaka further teaches that the system comparing the probe optical strength level to a predetermined gain tilt value to generate a first comparison result (fig. 5, reference voltage source 16b); and controlling said amplifying step based upon the first comparison result (fig. 5, comparator 16a); and controlling said amplifying step based upon the second comparison result (fig. 5, first controller).

Regarding claims 3, 5, 16, and 18, the predetermined gain tilt value is inherently retrieved from a storage table (fig. 5, 16b; column 9, lines 37-42) in the system.

Regarding claims 12-13, and 24-25, it is inherent that the amplifying step is adjusted with respect to an output level of the amplified wave division multiplexed optical signal, and is adjusted with respect to a gain tilt of the amplified wave division multiplexed optical signal (column 8, lines 22-31).

Regarding claim 26, Kosaka further discloses that the number of wavelengths is counted (column 9, lines 51-58).

Regarding claims 27 and 33, Irie further teaches to monitor optical strength level of the shortest one of the wavelength; or to monitor optical strength level of the longest one of the wavelength (column 9, lines 28-35).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5, 12-18, 24-28, and 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Irie (U.S. Patent US 6,682,713 B2) in view of Sugata (U.S. Patent US 5,907,429).

Regarding claims 1 and 14, Irie teaches a system of controlling optical signal during transmission, comprising: a first (fig. 11, the optical fiber between 26 and 34) and second optical fibers (fig. 11, the optical fiber between 48 and 28) for transmitting a wave division multiplexed optical signals having a predetermined set of ranges of wavelength (fig. 1, terminal device 2 comprising a plurality of transmitters 12 and an optical multiplexing unit 14 to generate wave division multiplexed optical signals of a predetermined wavelength ranges); an amplifier (fig. 11, elements 30,32, and 48) connected to the first optical fiber for amplifying the wave division multiplexed optical

signal according to a predetermined amplification characteristic (the amplification characteristic in inherently predetermined) to generate an amplified wave division multiplexed optical signal; a first monitor (fig. 11, detector PD 78) connected to the second optical fiber for monitoring a total optical strength level of at least one of the ranges of the amplified wave division multiplexed optical signal (column 8, lines 22-25); a second monitor (fig. 11, TILT SENSOR 72) connected to the second optical fiber for monitoring a probe optical strength level of at least one of the wavelengths of the amplified wave division multiplexed optical signal (column 8, lines 16-21); and an adjustment unit (fig. 11, element 74 and 80) connected to the amplifier, the first and second monitor for adjusting the amplification characteristic based upon the total optical strength level and the probe optical strength level so as to substantially reduce a gain tilt and an optical signal-to-noise ratio in the amplified wave division multiplexed optical signal (column 8, lines 16-31). The system of Irie differs from the claimed invention in that Irie does not specifically disclose to monitor an average value of a total optical strength level of at least one of the ranges of the amplified wave division multiplexed optical signal and adjust amplification so that the average value of the total strength level and the probe optical strength are substantially matched in order to substantially reduce a gain tilt. However, since the number of channels in the system of Irie does not change (fig.1), one of ordinary skill in the art at the time when the invention was made would be readily obtain an average value from the total optical strength level. For example, Sugata discloses that if the total power of N channel is NPo, then the average power is Po (column 2, lines 65-67 and column 3, lines 1-5). Therefore, it would have

been obvious for one of ordinary skill in the art at the time when the invention was made to monitor an average value of a total optical strength, as it is taught by Sugata, and adjust amplification so that the average value of the total strength level and the probe optical strength are substantially matched in order to control the amplification of the amplifier.

Regarding claims 2, 4, 15, and 17, Irie further teaches that the system comparing the probe optical strength level to a predetermined gain tilt value (inherent) to generate a first comparison result (fig. 11, CONTROL CIRCUIT 74); and controlling said amplifying step based upon the first comparison result (fig. 11, CONTROL CIRCUIT 74 and pump laser LD 36); comparing (inherent) the total optical strength level to a predetermined output level value to generate a second comparison result (fig. 11, CONTROL CIRCUIT 80); and controlling said amplifying step based upon the second comparison result (fig. 11, CONTROL CIRCUIT 80 and pump laser LD 42).

Regarding claims 3, 5, 16, and 18, the predetermined gain tilt value is inherently retrieved from a storage table (fig. 5, 64; column 6, lines 32-44) in the system taught by Irie.

Regarding claims 12-13, and 24-25, it is inherent that the amplifying step is adjusted with respect to an output level of the amplified wave division multiplexed optical signal, and is adjusted with respect to a gain tilt of the amplified wave division multiplexed optical signal (column 8, lines 22-31).

Regarding claim 26, Irie further discloses that the transmission capacity by a single optical fiber can be increased according to the number of WDM channel (column 1, lines 51-53). Therefore, the number of wavelengths is inherently counted.

Regarding claims 27 and 33, as they are understood in view of the above 112 problem, Irie further teaches to monitor optical strength level of the shortest one of the wavelength.

Regarding claims 28 and 34, as they are understood in view of the above 112 problem, Irie further teaches to monitor optical strength level of the longest one of the wavelength.

3. Claims 6-11, and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Irie (U.S. Patent US 6,682,713 B2) in view of Sugata (U.S. Patent US 5,907,429) and further in view of Kobayashi et al. (U.S. Patent US 6,111,688).

Regarding claims 6 and 19, Irie and Sugata differs from the claimed invention in that Irie and Sugata do not specifically teach monitoring an input total optical strength level of at least one of the ranges of the wave division multiplexed optical signal; and monitoring an input probe optical strength level of at least one of the wavelengths of the wave division multiplexed optical signal as claimed. However, it is well known to a person of ordinary skilled in the art at the time when the invention was made to monitor both input and output powers of an optical amplifier to control the gain and output power of the optical amplifier. For example, Kobayashi in figure 4 teaches to control the gain tilt and gain power (fig. 4, Gain CALCULATING CIRCUIT 60 and CONTROL CIRCUIT

30) of an optical amplifier by monitoring both the input (fig. 4, Coupler 42, filter 56, and detector 58) and output (fig.4, coupler 48, filter 62, and detector 64) of the optical amplifier. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to further monitoring an input total optical strength level of at least one of the ranges of the wave division multiplexed optical signal using a third monitor; and further monitoring an input probe optical strength level of at least one of the wavelengths of the wave division multiplexed optical signal using a fourth monitor. One person of ordinary skill in the art would have been motivated to introduce the additional monitors in order to precisely control the optical amplifier.

Regarding claims 7, 10, and 20, Irie further teaches transmitting the amplified wave division multiplexed optical signal to a receiving unit (fig. 1, Receiving Unit 4) via an optical fiber of a predetermined length (inherent). Irie differs from the claimed invention in that Irie does not specifically teach monitoring a transmitted total optical strength level of at least one of the ranges of the amplified wave division multiplexed optical signal at the receiving unit after said transmitting step; and monitoring a transmitted probe optical strength level of at least one of the wavelengths of the amplified wave division multiplexed optical signal at the receiving unit after transmitting step. However, it is well known to a person in the art at the time when the invention was made to include a pre-amplifier to a receiving WDM, such as the amplifier 18 in fig. 1 of Kobayashi, to boost the optical signal before the demultiplexer of the receiving WDM. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to include an optical amplifier, such as the one in fig. 11

of Irie, in the receiving unit and monitoring a transmitted total optical strength level (Irie, fig. 11, coupler 76 and detector 78) of at least one of the ranges of the amplified wave division multiplexed optical signal using a fifth monitor at the receiving unit after said transmitting step; and monitoring a transmitted probe optical strength level (Irie, fig. 11, coupler 76 and TILT SENSOR 72) of at least one of the wavelengths of the amplified wave division multiplexed optical signal using a sixth monitor at the receiving unit after transmitting step in order to boost the optical signal power before the demultiplexer of the receiving unit and balance the optical channels at the receivers.

Regarding claims 8-9, and 22-23, because the gain tilt and output optical power of the amplifier in the system by Irie are adjustable. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to adjust the optical amplifiers to obtain a desired optical strength level, including a sum of the input total optical strength level and a sum of the input probe optical strength level at a transmission unit before transmission and the transmitted prove optical strength level and a sum of the input probe optical strength level at a receiving unit after the transmission is identical in the modified system by Irie and Kobayashi. One person of ordinary skill in the art would have been motivated to adjust the amplifiers to obtain a desired optical strength level at the receiving unit in order to balance the performance of all of the channels.

Regarding claim 11 and 21, Irie further teaches that the amplifying step is adjusted based upon the total optical strength level, the probe optical strength level, the

transmitted total optical strength level and the transmitted probe optical strength level (fig. 11).

4. Claims 29-30, and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Irie (U.S. Patent US 6,682,713 B2) in view of Sugata (U.S. Patent US 5,907,429) and further in view of Lagerstrom et al. (U.S. Patent US 6,215,583 B1).

Regarding claims 29-30 and 35-36, the system of Irie and Sugata differs from the claimed invention in that Irie and Sugata do not specifically teach to use a narrow band filter for selecting a probe wavelength. However, it is well known in the art to use a narrow band filter to select a wavelength from a WDM signal. For example, Lagerstrom teaches to use a narrow band filter to extract a signal using a narrow band filter (column 2, lines 20-26). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate a narrow band filter, as it is taught by Lagerstrom, in the system of Irie to replace the transmission filter in the tilt monitor in order to increase the sensitivity of tilt sensor.

Response to Arguments

5. Applicant's arguments with respect to claims 1-25 have been considered but are moot in view of the new ground(s) of rejection.

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Shimojoh et al. (U.S. Patent US 6,344,914 B1) disclose a gain equalizer for equalizing the gain of an optical amplifier; Yang (U.S. Patent US 6804,464 B2) discloses a wavelength management apparatus for optical networking; Sugaya et al. (U.S. Patent US 6,480,329 B2) discloses an optical amplifier; Nakazato (U.S. Patent US 6,599,039 B1) discloses an optical transmission monitoring apparatus; and Hainberger et al. (U.S. Patent Application Publication US 2004/0004756 A1) disclose a control scheme for optical channels in wideband WDM optical fiber transmission system.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quan-Zhen Wang whose telephone number is (571) 272-3114. The examiner can normally be reached on 8:30 AM - 5:00 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

qzw
12/14/2005

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